

WHAT IS CLAIMED IS:

1. A method of extracting a region of interest from continuous frames of cross sectional images of an organism, the continuous frames including a first frame, a second frame that is next to the first frame, a
5 third frame that is next to the second frame, and onward frames that are after the third frame, comprising:
 - calculating an initial judgment criterion for the region of interest in the first frame;
 - a first judging of judging whether a specific region in the second
10 frame is any one of inside and outside of the region of interest based on the initial judgment criterion and values of pixels in the specific region; and
 - a second judging of judging whether a specific region in the third frame and in the onward frames is any one of inside and outside of the
15 region of interest based on values of pixels of regions that have been judged to be inside the region of interest in the previous frame.
2. The method according to claim 1, wherein the first frame is either of one frame and a plurality of frames, and
20 the calculating includes setting a dummy region of interest by manual operation, and calculating the initial judgment criterion based on the dummy region.

3. The method according to claim 1, wherein the first judging and the second judging includes

5 setting a temporary region of interest in the frame under consideration at a position that is same as the region of interest in a frame previous to the frame under consideration, and
judging whether each pixel that is adjacent to a boundary of the temporary region of interest is any one of inside and outside of the region of interest.

10 4. The method according to claim 3, wherein the judging includes expanding the region of interest with respect to the region of interest of the previous frame, when a pixel to be allocated to the region of interest is outside of the temporary region, to thereby include the pixel under consideration inside of the region of interest in the frame under
15 consideration, and

contracting the region of interest with respect to the region of interest of the previous frame, when a pixel not to be allocated to the region of interest is inside of the temporary region, to thereby not include the pixel under consideration inside of the region of interest in the frame
20 under consideration.

5. The method according to claim 1, wherein in judgment of allocation of the frame continuing with the part of the continuous frames and the frame from the frame that is in continuity with the frame onward,
25 the frames from among a plurality of continuous frames from the frame

previous to the one that is to be judged are made to correspond with the pixel unit and while acquiring a local region of prescribed size including each pixel of the frame that is to be judged, the judgment criterion set for the part of the region of interest including the local region is used at the
5 second step.

6. The method according to claim 1, further comprising storing values of pixels of the region of interest whereby the values of pixels can be displayed.

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7. A method of extracting a region of interest from continuous frames of cross sectional images of an organism, the continuous frames including a first frame, a second frame that is next to the first frame, a third frame that is next to the second frame, and onward frames that are
15 next to the third frame, comprising:

calculating a first initial judgment criteria and a second initial judgment criteria, wherein the first initial judgment criteria is for judging whether a specific region in the first frame is inside of the region of interest, and the second initial judgment criteria is for judging whether a
20 specific region in the first frame is outside of the region of interest;

a first judging of judging whether a specific region in the second frame is any one of inside and outside of the region of interest based on the first judgment criteria, the second judgment criteria, and values of pixels in the specific region; and

25 a second judging of judging whether a specific region in the third

frame and in the onward frames is any one of inside and outside of the region of interest based on values of pixels that have been allocated to inside of the region of interest and a values of pixels that have been judged to be inside the region of interest and values of pixels that have
5 been judged to be outside the region of interest in the previous frame.

8. The method according to claim 7, wherein the first frame is either of one frame and a plurality of frames, and
the calculating includes setting a dummy region of interest by
10 manual operation, and calculating the initial judgment criterion based on the dummy region.

9. The method according to claim 7, wherein the first judging and the second judging includes
15 setting a temporary region of interest in the frame under consideration at a position that is same as the region of interest in a frame previous to the frame under consideration, and
judging whether each pixel that is adjacent to a boundary of the temporary region of interest is any one of inside and outside of the region
20 of interest.

10. The method according to claim 9, wherein the judging includes expanding the region of interest with respect to the region of interest of the previous frame, when a pixel to be allocated to the region
25 of interest is outside of the temporary region, to thereby include the pixel

under consideration inside of the region of interest in the frame under consideration, and

contracting the region of interest with respect to the region of interest of the previous frame, when a pixel not to be allocated to the region of interest is inside of the temporary region, to thereby not include the pixel under consideration inside of the region of interest in the frame under consideration.

11. The method according to claim 7, wherein in judgment of allocation of the frame continuing with the part of the continuous frames and the frame from the frame that is in continuity with the frame onward, the frames from among a plurality of continuous frames from the frame previous to the one that is to be judged are made to correspond with the pixel unit and while acquiring a local region of prescribed size including each pixel of the frame that is to be judged, the judgment criterion set for the part of the region of interest including the local region is used at the second step.

12. The method according to claim 7, further comprising storing values of pixels of the region of interest whereby the values of pixels can be displayed.

13. A computer program that makes a computer execute extraction of a region of interest from continuous frames of cross sectional images of an organism, the continuous frames including a first frame, a second

frame that is next to the first frame, a third frame that is next to the second frame, and onward frames that are after the third frame, comprising:

calculating an initial judgment criterion for the region of interest in
5 the first frame;

a first judging of judging whether a specific region in the second frame is any one of inside and outside of the region of interest based on the initial judgment criterion and values of pixels in the specific region; and

10 a second judging of judging whether a specific region in the third frame and in the onward frames is any one of inside and outside of the region of interest based on values of pixels of regions that have been judged to be inside the region of interest in the previous frame.

15 14. The computer program according to claim 13, wherein the first frame is either of one frame and a plurality of frames, and

the calculating includes setting a dummy region of interest by manual operation, and calculating the initial judgment criterion based on the dummy region.

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15. The computer program according to claim 13, wherein the first judging and the second judging includes

setting a temporary region of interest in the frame under consideration at a position that is same as the region of interest in a

25 frame previous to the frame under consideration, and

judging whether each pixel that is adjacent to a boundary of the temporary region of interest is any one of inside and outside of the region of interest.

5 16. The computer program according to claim 15, wherein the judging includes

expanding the region of interest with respect to the region of interest of the previous frame, when a pixel to be allocated to the region of interest is outside of the temporary region, to thereby include the pixel
10 under consideration inside of the region of interest in the frame under consideration, and

contracting the region of interest with respect to the region of interest of the previous frame, when a pixel not to be allocated to the region of interest is inside of the temporary region, to thereby not include
15 the pixel under consideration inside of the region of interest in the frame under consideration.

17. The computer program according to claim 13, wherein in judgment of allocation of the frame continuing with the part of the
20 continuous frames and the frame from the frame that is in continuity with the frame onward, the frames from among a plurality of continuous frames from the frame previous to the one that is to be judged are made to correspond with the pixel unit and while acquiring a local region of prescribed size including each pixel of the frame that is to be judged, the
25 judgment criterion set for the part of the region of interest including the

local region is used at the second step.

18. The computer program according to claim 13, further comprising
storing values of pixels of the region of interest whereby the values of
5 pixels can be displayed.

19. A computer program that makes a computer execute extraction of
a region of interest from continuous frames of cross sectional images of
an organism, the continuous frames including a first frame, a second
10 frame that is next to the first frame, a third frame that is next to the
second frame, and onward frames that are next to the third frame,
comprising:

calculating a first initial judgment criteria and a second initial
judgment criteria, wherein the first initial judgment criteria is for judging
15 whether a specific region in the first frame is inside of the region of
interest, and the second initial judgment criteria for judging whether a
specific region in the first frame is outside of the region of interest;

a first judging of judging whether a specific region in the second
frame is any one of inside and outside of the region of interest based on
20 the first judgment criteria, the second judgment criteria, and values of
pixels in the specific region; and

a second judging of judging whether a specific region in the third
frame and in the onward frames is any one of inside and outside of the
region of interest based on values of pixels that have been allocated to
25 inside of the region of interest and a values of pixels that have been

judged to be inside the region of interest and values of pixels that have been judged to be outside the region of interest in the previous frame.

20. The computer program according to claim 19, wherein the first
5 frame is either of one frame and a plurality of frames, and
the calculating includes setting a dummy region of interest by
manual operation, and calculating the initial judgment criterion based on
the dummy region.

10 21. The computer program according to claim 19, wherein the first
judging and the second judging includes
setting a temporary region of interest in the frame under
consideration at a position that is same as the region of interest in a
frame previous to the frame under consideration, and
15 judging whether each pixel that is adjacent to a boundary of the
temporary region of interest is any one of inside and outside of the region
of interest.

22. The computer program according to claim 21, wherein the judging
20 includes
expanding the region of interest with respect to the region of
interest of the previous frame, when a pixel to be allocated to the region
of interest is outside of the temporary region, to thereby include the pixel
under consideration inside of the region of interest in the frame under
25 consideration, and

contracting the region of interest with respect to the region of interest of the previous frame, when a pixel not to be allocated to the region of interest is inside of the temporary region, to thereby not include the pixel under consideration inside of the region of interest in the frame under consideration.

23. The computer program according to claim 19, wherein in judgment of allocation of the frame continuing with the part of the continuous frames and the frame from the frame that is in continuity with the frame onward, the frames from among a plurality of continuous frames from the frame previous to the one that is to be judged are made to correspond with the pixel unit and while acquiring a local region of prescribed size including each pixel of the frame that is to be judged, the judgment criterion set for the part of the region of interest including the local region is used at the second step.

24. The computer program according to claim 19, further comprising storing values of pixels of the region of interest whereby the values of pixels can be displayed.

25. An image processing apparatus that extracts a region of interest from continuous frames of cross sectional images of an organism, the continuous frames including a first frame, a second frame that is next to the first frame, a third frame that is next to the second frame, and onward frames that are after the third frame, comprising:

a calculating unit that calculates an initial judgment criterion for the region of interest in the first frame;

a first judging unit that judges whether a specific region in the second frame is any one of inside and outside of the region of interest
5 based on the initial judgment criterion and values of pixels in the specific region; and

a second judging unit that judges whether a specific region in the third frame and in the onward frames is any one of inside and outside of the region of interest based on values of pixels of regions that have been
10 judged to be inside the region of interest in the previous frame.

26. The image processing apparatus according to claim 25, further comprising a storage unit that stores flag information indicating display target for each pixel of the region of interest.

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27. The image processing apparatus according to claim 26, further comprising a display unit that displays the region of interest based on the flag information stored by the storage unit.

20 28. An image processing apparatus that extracts a region of interest from continuous frames of cross sectional images of an organism, the continuous frames including a first frame, a second frame that is next to the first frame, a third frame that is next to the second frame, and onward frames that are after the third frame, comprising:

25 a calculating unit that calculates a first initial judgment criteria and

a second initial judgment criteria, wherein the first initial judgment criteria is for judging whether a specific region in the first frame is inside of the region of interest, and the second initial judgment criteria is for judging whether a specific region in the first frame is outside of the region of interest;

5 a first judging unit that judges whether a specific region in the second frame is any one of inside and outside of the region of interest based on the first judgment criteria, the second judgment criteria, and values of pixels in the specific region; and

10 a second judging unit that judges whether a specific region in the third frame and in the onward frames is any one of inside and outside of the region of interest based on values of pixels that have been allocated to inside of the region of interest and a values of pixels that have been judged to be inside the region of interest and values of pixels that have
15 been judged to be outside the region of interest in the previous frame.

29. The image processing apparatus according to claim 28, further comprising a storage unit that stores flag information indicating display target for each pixel of the region of interest.

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30. The image processing apparatus according to claim 29, further comprising a display unit that displays the region of interest based on the flag information stored by the storage unit.